

SECTION 08630
METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

0.1 DESCRIPTION OF WORK

- A.** Work Included: This Section specifies the following items.
1. Aluminum-framed skylights with glass retained by field-installed pressure caps on four sides.
- B.** Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 07620 - SHEET METAL FLASHING AND TRIM; metal flashings installed at perimeters of assemblies.
 2. Section 07920 - JOINT SEALANTS; sealants installed at perimeters of metal-framed skylights.
 3. Section 08801 - GLASS AND GLAZING; glass units installed in metal-framed skylights.

0.2 PERFORMANCE REQUIREMENTS

- A.** Provide metal-framed skylights, including anchorage, capable of withstanding, without failure, the effects of the following:
1. Structural loads.
 2. Thermal movements.
 3. Movements of supporting structure.
 4. Dimensional tolerances of building frame and other adjacent construction.
- B.** Failure includes the following:
1. Deflection exceeding specified limits.
 2. Water leakage.
 3. Thermal stresses transferred to building structure.
 4. Noise or vibration created by wind and thermal and structural movements.
 5. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 6. Loosening or weakening of fasteners, attachments, and other components.
 7. Sealant failure.

- C.** Structural Loads: Wind loads, snow loads, concentrated live loads and seismic loads as required by Code.
- D.** Deflection of Framing Members:
 - 1. Deflection Normal to Glazing Plane:
 - a. Spans Up to 20 Feet: Limited to 1/175 of clear span or 1 inch whichever is smaller.
 - b. Spans Exceeding 20 Feet: Limited to 1/240 of clear span.
 - c. Glass Edge Deflection: Limit edge deflection of individual glass lites to 3/4 inch.
 - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch whichever is smaller and amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
- E.** Lateral Bracing of Framing Members: Compression flanges of flexural members are laterally braced by cross members with minimum depth equal to 50 percent of flexural member that is braced. Glazing does not provide lateral support.
- F.** Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F ambient; 180 deg F material surfaces.

0.3 PERFORMANCE TESTING

- A.** Provide metal-framed skylights that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies.
- B.** Structural-Performance Test: ASTM E 330.
 - 1. Performance at Design Load: When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - 2. Performance at Maximum Test Load: When tested at [150] <Insert number> percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main supporting members exceeding [0.2] <Insert number> percent of span.
 - 3. Test Durations: As required by design wind velocity but not less than 10 seconds.

- C.** Air-Infiltration Test: ASTM E 283.
 - 1. Minimum Static-Air-Pressure Difference: 1.57 lbf/sq. ft.
 - 2. Maximum Air Leakage: 0.06 cfm/sq. ft.
- D.** Test for Water Penetration under Static Pressure: ASTM E 331.
 - 1. Minimum Static-Air-Pressure Difference: 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
 - 2. Water Leakage: None.
- E.** Test for Water Penetration under Dynamic Pressure: AAMA 501.1.
 - 1. Dynamic Pressure: 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft.
 - 2. Water Leakage: No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.

0.4 SUBMITTALS

- A.** Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal-framed skylights.
- B.** Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer licensed in the Commonwealth of Massachusetts responsible for their preparation.
- C.** Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D.** Fabrication Sample: Of each framing intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- E.** Independent testing and inspecting agency inspection reports required by paragraph 3.3A.

- F.** Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for metal-framed skylights.
- G.** Maintenance Data: For metal-framed skylights to include in maintenance manuals.
- H.** Installer and Testing Agency Qualifications
- I.** Field test and inspection reports required by paragraph 3.3A.
- J.** Welding qualifications for welders and welding procedures.
- K.** Warranties: Special warranties specified in this Section.

0.5 QUALITY ASSURANCE

- A.** Installer Qualifications: Entity capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
- B.** Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.
- C.** Product Options: Information on Drawings and in Specifications establishes requirements for skylights' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including testing conducted by an independent testing agency and in-service performance.
- D.** Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
- E.** Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.

0.6 PROJECT CONDITIONS

- A.** Field Measurements: Indicate measurements on Shop Drawings.

0.7 WARRANTY

- A.** Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-framed skylights that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage.
 2. Warranty Period: Ten years from date of Substantial Completion.
- B. Special Finish Warranty:** Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
1. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
 2. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Architectural Skylight Co., Inc.
 2. Kawneer.
 3. LinEl Signature.
 4. Naturalite Skylight Systems; Vistawall Group.
 5. Skyline Products, Inc.
 6. Wasco Products, Inc.

0.2 FRAMING SYSTEMS

- A. Aluminum:** Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
- B. Pressure Caps:** Manufacturer's standard aluminum components that mechanically retain glazing. Include snap-on aluminum trim that conceals fasteners.

- C.** Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.
- D.** Anchors, Fasteners, and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding; compatible with adjacent materials.
 - 1. At pressure caps, use ASTM A 193/A 193M, 300 series stainless-steel screws.
 - 2. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - 3. Exposed Fasteners:
 - a. Use exposed fasteners with countersunk Phillips screw heads.
 - b. Finish exposed portions to match framing system.
 - 4. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.
- E.** Anchor Bolts: ASTM A 307, Grade A hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- F.** Concealed Flashing: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- G.** Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than 0.040 inch thick.
- H.** Framing Gaskets: Manufacturer's standard
- I.** Framing Sealants: As recommended in writing by manufacturer.

0.3 GLAZING SYSTEMS

- A.** Glazing: As specified in Section 08801 - GLASS AND GLAZING.
- B.** Spacers, Setting Blocks, and Gaskets: Manufacturer's standard elastomeric types.
- C.** Glazing Sealants: As recommended in writing by manufacturer.
 - 1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; neutral-curing silicone formulation compatible with structural sealant and other components with which it comes in contact; and recommended in writing by structural- and weatherseal-sealant and metal-framed skylight manufacturers for this use.
 - a. Color: Matching structural sealant.

0.4 ACCESSORY MATERIALS

- A.** Insulating Materials: Specified in Section 07210 - BUILDING INSULATION.
- B.** Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

0.5 FABRICATION

- A.** Fabricate aluminum components before finishing.
- B.** Fabricate aluminum components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
- C.** Fabricate aluminum sill closures with weep holes and for installation as continuous component.
- D.** Reinforce aluminum components as required to receive fastener threads.
- E.** Weld aluminum components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

0.6 ALUMINUM FINISHES

- A.** General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B.** High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Engineer from manufacturer's full range.

PART 3 - EXECUTION

0.1 EXAMINATION

- A.** Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A.** General:
 1. Comply with manufacturer's written instructions.
 2. Do not install damaged components.
 3. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
 4. Rigidly secure nonmovement joints.
 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 6. Seal joints watertight, unless otherwise indicated.
- B.** Metal Protection: Where aluminum will contact dissimilar materials, protect against galvanic action by painting contact surfaces with bituminous paint or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
- C.** Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.
- D.** Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
- E.** Install components plumb and true in alignment with established lines and elevations.
- F.** Install glazing in accordance with requirements specified in Division 8 Section "Glazing."
- G.** Install insulation materials as specified in Division 7 Section "Building Insulation."

- H. Erection Tolerances:** Install metal-framed skylights to comply with the following maximum tolerances:
1. Alignment: Limit offset from true alignment to 1/32 inch where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches; otherwise, limit offset to 1/8 inch.
 2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet but no greater than 1/2 inch over total length.

0.3 FIELD QUALITY CONTROL

- A. Testing Agency:** The Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test and inspection reports.
- B. Hold Point - Testing Services:** Testing and inspecting of representative areas to determine compliance of installed skylights with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
1. ASTM C 1401 recommendations for quality-control procedures.
 2. Water Penetration under Static Pressure: Before installation of interior finishes has begun, areas shall be tested according to ASTM E 1105.
 - a. Test Procedures: Test under cyclic static air pressure.
 - b. Water Penetration: None.
 3. Water-Spray Test: Before installation of interior finishes has begun, skylights shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C. Repair or remove work** where test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting,** at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

PART 4 - MEASUREMENT AND PAYMENT

0.1 MEASUREMENT

- A.** Metal framed skylights will be measured as per square foot complete in place, including all preparation, glass and glazing, accessories and incidentals.

0.2 PAYMENT

- A.** Payment for metal framed skylights will be made at the Contract unit price for the quantities as specified above.

0.3 PAYMENT ITEMS

| ITEM NO. | DESCRIPTION | UNIT |
|----------|------------------------|------|
| 0782.006 | METAL-FRAMED SKYLIGHTS | EA |

END OF SECTION